Genetics

EVOLUTION OF SAMT GENE EXPRESSION PATTERNS AND ITS RELATED FUNCTIONS IN THE PLANT FAMILY SOLANACEAE

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Floral scent plays an important ecological role in the interaction between plants and their pollinators. One common and important component of floral scent is methyl salicylate, which is particularly attractive to moths. The gene SAMT is involved in the production of methyl salicylate from the precursor salicylic acid. The aim of our research was to isolate this gene in various species of the plant family Solanaceae, expecting to find it only in the moth-pollinated ones. However, our results indicate that every species examined possess the gene, including species that are not known to emit methyl salicylate from their flowers. Additionally, the SAMT sequences were highly conserved in all lineages. One explanation for the presence of SAMT in all lineages is that SAMT has other functions. For instance, in *Nicotiana tabacum* (tobacco) methyl salicylate is known to be a defense-signaling molecule. We performed a series of experiments to examine the role of SAMT in defense signaling in other species. Our results indicate that SAMT is indeed involved in defense signaling in all the plants studied as well as in pollinator attraction in some moth pollinated species. In addition to these functions, SAMT is also expressed at low levels at all times in some species for an unknown function. Our results suggest that SAMT was ancestrally used in defense signaling, and only in some species has pollinator based selection led to the evolution of methyl salicylate production in flowers.